Simon • Bymaster Inc.
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FAULT INVESTIGATION
David Eccles School of Business Building
University of Utah
Salt Lake County, Utah

PREPARED FOR:

University of Utah Campus Design & Construction
University Services Building
1795 East South Campus Drive, Room 201
Salt Lake City, Utah 84112-9403

SBI Project No. 2-06-344

May 15, 2007

Simon • Bymaster Inc.

Geologic, Environmental, and Geotechnical Consultants

1025 East 400 North
Bountiful, Utah 84010
801.943.3100

May 15, 2007

Bill Billingsley
University of Utah
Campus Design & Construction
University Services Building
1795 East South Campus Drive, Room 201
Salt Lake City, Utah 84112-9403

Subject: **FAULT INVESTIGATION**
David Eccles School of Business Building
University of Utah
Salt Lake County, Utah
SBI Project No: 2-06-344

Dear Mr. Billingsley,

Enclosed are the findings of the fault investigation performed for the proposed David Eccles School of Business Building. The purpose of the investigation is to evaluate the potential for surface fault rupture at the site. The accompanying report describes the methods used in the investigation, our conclusions, and presents recommendations for proposed development of the property relative to active faulting near the site.

If you have any questions, please feel free to contact the undersigned or Bill Bymaster, Principal. The opportunity to be of service on this project is appreciated.

Very truly yours,

SBI

David B. Simon

LICENSED PROFESSIONAL GEOLOGIST
05-15-07
DAVID B. SIMON
5234321-2250
STATE OF UTAH

David B. Simon, P.G.
Principal Engineering Geologist

dist: 4/addressee

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EXECUTIVE SUMMARY

The findings of the investigation follow:

1. Based on the information provided, we understand proposed development consists of demolition of the existing School of Business building and the construction of a multi-story concrete structure.

2. The proposed building site is located in a Salt Lake County surface fault rupture special study area. Two fault investigations were performed near the site of the proposed David Eccles School of Business Building. Both investigations documented stratigraphically continuous sediments in their trenches; therefore, it was concluded that faulting had not occurred at the respective sites. University of Utah Campus Design & Construction has assumed the prior fault investigations are reliable and has limited this investigation to the part of the Salt Lake County surface fault rupture special study area immediately east of the proposed building site, not investigated by prior studies.

3. Late Pleistocene to middle Holocene-age (14,000 to 5,000 years old) fan alluvium was observed in the exploratory trench.

4. The relatively horizontal late Pleistocene to middle Holocene-age fan alluvium was demonstrably unbroken and stratigraphically continuous.

5. The unbroken and stratigraphically continuous late Pleistocene to middle Holocene-age fan alluvium documented at the site constitutes reasonable geologic evidence that Holocene-age (i.e., "active") faults are not present within the area investigated.

6. From the standpoint of surface fault rupture, the building site is suitable for the proposed development, provided the recommendations presented herein are incorporated into design and development of the project.

7. The site is situated within a seismically active area; moderate to strong ground shaking should be anticipated within the life time of the development.

8. Owing to the nature of the deposits and site topography, potential damage due to secondary effects of seismic activity are judged to be low for earthquake induced rock falls and landsliding.

Executive Summary - continued

9. The Salt Lake County Planning Department, Surface Rupture and Liquefaction Potential Special Study Areas Map (Salt Lake County, 1995), indicates that the site is located in an area of very low liquefaction potential. Such areas have a less than 5 percent probability that the critical ground acceleration needed to induce liquefaction will be exceeded in 100 years. It was not within the scope of this study to evaluate the site-specific liquefaction susceptibility at the site.

Based on the findings of the investigation, we recommend:

1. A geotechnical study should be performed prior to design of structures. A copy of this report should be provided to the geotechnical engineer.

2. An SBI engineering geologist should observe all construction cuts and foundation excavations to substantiate the findings contained herein. If faults are identified in construction cuts or foundation excavations, further investigation, relocation of proposed structures, modification of the building foundations, and/or additional structural reinforcement may be required.

3. The materials used to backfill the exploratory trench were not compacted. In areas where foundations, slabs, or pavements extend into or cross the trench, the existing backfill should be completely removed and replaced by properly compacted engineered fill.

4. Additional structural reinforcement should be considered for proposed structures owing to the proximity of the site to active faults and associated potential for high levels of ground shaking.

5. Review and consideration of the Federal Emergency Management Agency (FEMA, 2005) document for avoiding earthquake damage; which suggests strapping water heaters to wall studs and installing flexible gas and water lines to reduce risk of fire and water damage in the event of an earthquake.

The executive summary is not intended to replace the information presented in the report of which the executive summary is an essential part. The executive summary should not be used separately from the report and is only provided as an overview, to summarize the primary conclusions and recommendations. The executive summary may omit a number of details, any one of which could be crucial to the proper interpretation and application of the report and implementation of the recommendations.

1.0 INTRODUCTION

This report presents the findings of a fault investigation performed for the proposed David Eccles School of Business Building. The location of the property is shown on Figure 1, Location Map (figures are presented in Appendix A).

Based on the information provided, we understand proposed development consists of demolition of the existing School of Business Building and the construction of a multi-story concrete structure. The approximate location of the proposed structure is shown on Figure 2, Site Plan.

As shown on Figure 3, Surface Fault Rupture Special Study Area Map, the parcel is located in a Salt Lake County surface fault rupture special study area. Surface fault rupture special study areas may contain Holocene-age faults (i.e., active)[1]. The Utah Geological Survey recommends site-specific geologic investigations be performed for structures intended for human occupancy that are located within 300 to 400 feet of potentially active faults (Christenson and others, 2003).

The primary purpose of the geologic investigation is to prevent critical facilities or structures intended for human occupancy from being constructed over a Holocene-age fault. If a fault is discovered and determined to be Holocene-age, a suitable setback from the fault is recommended such that the structure is not located astride the fault trace.

Owing to the proximity of the site to a potential Holocene-age fault, the University of Utah Campus Design & Construction department requested a fault investigation be performed for the parcel. The purpose of this investigation is to assess the suitability of the site for the proposed development from the standpoint of surface fault rupture.

2.0 PRIOR INVESTIGATIONS

Two fault investigations were performed near the site of the proposed David Eccles School of Business Building (Figure 2). These investigations were performed for the C. Rolland Christensen Classroom Building (AGRA, 1998), located about 150 feet south of the site, and for the Language and Communications Building (Delta, 1989), located about 400 feet north of the property.

1 An active fault is defined by the Utah Geological Survey as a Holocene-age fault; a fault displaying evidence of displacement along one or more of its traces during Holocene time (about 10,000 years ago to the present; Christenson and others, 2003).

Both investigations documented stratigraphically continuous sediments in their trenches; therefore, it was concluded that faulting had not occurred at the respective sites. University of Utah Campus Design & Construction has assumed the prior fault investigations are reliable and has limited this investigation to the part of the Salt Lake County surface fault rupture special study area immediately east of the proposed building site, not investigated by prior studies.

3.0 SCOPE OF WORK

3.1 Review of Available Published Geologic Reports and Maps

Available published geologic literature concerning rock units, faulting, and seismicity in the area was reviewed (see Section 15.0, References).

3.2 Interpretation of Stereo-paired Aerial Photographs

Aerial photographs of the site vicinity were examined stereoscopically for the presence of photo-lineaments[2] which might be indicative of faulting. Aerial photographs reviewed for the investigation are summarized in Section 15.0.

3.3 Site Reconnaissance

An SBI engineering geologist performed a reconnaissance of the property and vicinity for evidence of surface faulting and evaluation of geologic units and pertinent surface features.

3.4 Subsurface Investigation

As shown on Figure 2, a trench was excavated west of the southwest corner of the Milton Bennion Hall Building. The location of the trench was based on access (the proposed building site is well developed with structures, concrete walk-ways, plazas, and underground utilities). The trench, totaling about 92 feet in length, was excavated by a rubber-tire backhoe with a 24-inch wide bucket to depths of about 13 feet below existing ground surface.

Materials exposed in the trench are described on the Trench Profile, Figure 4 and were classified, when applicable, in accordance with the Unified Soil Classification System (ASTM Method D 2488). Color designations follow standard Munsell Soil Color notations.

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[2] *Lineament*: A linear topographic, tonal or vegetative surface feature believed to reflect crustal structure.

The trench was located to within 1± feet by SBI using a fiberglass measuring tape, a Brunton compass, and the southwest corner of Milton Bennion Hall as the reference point. Trench exposures were reviewed on January 31, 2007 by Greg McDonald and Chris DuRoss, geologists with the Utah Geological Survey.

3.5 Engineering Geologic Analyses and Report

Data obtained were evaluated and engineering geologic analyses were performed, which included preparation of this report presenting the findings and conclusions developed during the investigation.

4.0 SITE CONDITIONS

The area west of Milton Bennion Hall is landscaped with sod, sloping gently to the southwest at a gradient of about 2 percent. The trench location is at an elevation of 4,730± feet above mean sea level.

5.0 GENERAL SEISMIC SETTING

Salt Lake County is situated near the center of the Intermountain Seismic Belt (ISB). The ISB, which extends from Arizona, through western Utah, to northern Montana, represents one of the most seismically active areas in the continental United States (Smith and Sbar, 1974). It has been well documented that repeated, normal-slip surface faulting has occurred in northern Utah throughout late Pleistocene and Holocene time. Most of this faulting has occurred along the approximately 230-mile long Wasatch fault zone (WFZ; Lund, 1990; Black and others, 2003).

The WFZ consists of a series of normal-slip faults with relative movement down to the west and up to the east. Ten major fault segments are recognized along the WFZ (Machette and others, 1992), which are believed to be independent in regards to their potential for ground rupture. These segments have distinct geomorphic expression and are clearly visible on aerial photographs.

In the Salt Lake Valley, the WFZ is represented by the Salt Lake City segment which extends for 23± miles along the east edge of the valley (Lund, 1990). Paleoseismic studies suggest that the active parts of the Salt Lake City segment consist of three en-echelon and sub-parallel sections (from north to south): the Warm Springs fault, the East Bench fault, and the Cottonwood section (Personius and Scott, 1992). A trace of the East Bench fault is located immediately west (≤50 feet) of the proposed building site (Figure 2).

6.0 GEOLOGY

The geologic setting of the area and geologic parameters of the property are discussed in this section. The general geology of the site is shown on Figure 5, Geologic Map.

6.1 General Geologic Setting

Many of the surficial deposits within Salt Lake Valley were deposited during the last pluvial lake cycle[3], referred to as the Bonneville lake cycle (Gilbert, 1875). Lake Bonneville began slowly rising from a low level about 28,000 years ago[4], reaching its highest level, the Bonneville high stand, around 15,500 years ago (late Pleistocene time: Madsen, 2000; Oviatt and others, 1992), at which time the ancestral lake covered much of western Utah, eastern Nevada, and southern Idaho.

The lake remained at the Bonneville high stand (corresponding elevation in the site area of approximately 5,200 feet above mean sea level) for several thousand years. About 14,500 years ago, the lake dropped about 400 feet (over a period of a few days to perhaps a week) to an altitude of about 4,800 feet (referred to as the Provo high stand: Oviatt and others, 1992), as a consequence of catastrophic down-cutting of the lake's outlet at Red Rock Pass in southern Idaho. The lake occupied the Provo high stand for a period of 500± years. About 14,000 years ago, Lake Bonneville began receding, reaching a level at or lower than the present Great Salt Lake approximately 12,000 years ago (Madsen, 2000). As the level of Lake Bonneville receded from the Bonneville high stand, alluvial fan[5] and debris-flow[6] deposits were emplaced at the canyon mouths along the mountain front (Personius and Scott, 1992).

6.2 Site Geology

The trench-site is located along the southwest flank of the Wasatch mountain range, on a dissected alluvial fan of middle Holocene to uppermost Pleistocene age (14,000 to 5,000 years old; Personius and Scott, 1992).

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3 *Pluvial lake cycle*: A lake formed in a period of exceptionally heavy rainfall; specifically a lake formed in the Pleistocene Epoch during a time of glacial advance, and presently either extinct or existing as a remnant (AGI, 1997).

4 Unless specifically noted otherwise, all ages in this report are radiocarbon years before present.

5 *Alluvial Fan*: A gently sloping fan-shaped landform (in plan view), created over time by stream deposition of eroded sediments. Deposition occurs where the stream emerges from a narrow drainage onto a plain or broad valley.

6 *Debris Flow*: Slurry of rock, soil, organic material, and water, transported extremely fast as a flow down narrow drainages and onto alluvial fans; basic process responsible for the formation of alluvial fans; includes mudflows, clear-water floods, and alluvial fan flooding.

About 1 to 8 feet of fill was documented at the site. The fill materials are underlain by a pedogenic horizon (A-horizon) which formed on the underlying fan alluvium. The fan alluvium consists primarily of sandy gravel (GP) with lenses of clayey silt (ML), gravelly sand (SP), and silty sand (SM). Detailed descriptions of the geologic units observed in the exploratory trench are presented on Figure 4.

Based on age designations in Personius and Scott (1992), the alluvial sediments are middle Holocene to uppermost Pleistocene age. Geologic units documented in the exploratory trench are summarized in the following table, Site Geologic Units.

Site Geologic Units

Geologic Unit	Unit Designation on Trench Profile, Figure 5	Geologic Age	Approximate radiocarbon age
Fill	Fill	Historic	n/a
Buried A horizon (pedogenic soil)	1	Holocene	<2,500± yrs.
Fan alluvium	2 - 7	Middle Holocene to late Pleistocene	5,000 to 14,000± yrs.

7.0 SITE RECONNAISSANCE

An SBI engineering geologist performed a reconnaissance of the property and vicinity for evidence of surface faulting and evaluation of geologic units and pertinent surface features. Owing to site development, site grading, and development of adjoining properties, lineaments either crossing or projecting toward the site could not be observed.

8.0 LINEAMENT ANALYSIS

As part of the investigation, aerial photographs of the site vicinity were examined stereoscopically for the presence of photo-lineaments which may be representative of faulting. No lineaments were observed either crossing or projecting toward the subject property.

9.0 REVIEW OF AVAILABLE GEOLOGIC REPORTS AND MAPS

Review of available geologic literature (Salt Lake County, 1995; Personius and Scott, 1992) indicates a trace of the East Bench fault has been documented immediately west

(≤50 feet) of the proposed building site (Figure 2). The general geology of the area and relative age of geologic units were obtained from Personius and Scott (1992; Figure 5).

10.0 FAULTING

To evaluate the area east of the proposed building site for the presence of active faults, a trench was excavated near the southwest corner of Milton Bennion Hall. The trench was oriented about N58°W, nearly perpendicular to the trend of the fault shown on Figure 3 (about N22°E). The criterion for locating the trench was to intercept faults of similar orientation, to avoid developed areas within the campus, and to provide the minimum footage of trenching necessary, such that surface fault rupture could be adequately assessed.

An active fault is defined by the Utah Geological Survey as a Holocene-age fault; a fault displaying evidence of displacement along one or more of its traces during within the past 10,000 years (Christenson and others, 2003). Therefore, when evaluating fault activity, it is desirable to excavate to a sufficient depth such that the entire Holocene sequence of sediments are observed or to excavate into Pleistocene age (>10,000 years old) sediments.

Late Pleistocene to middle Holocene-age (presumably 14,000 - 5,000 years old; see Section 6.2) fan alluvium was documented within the trench (unit af2 on Figure 5). The trench was excavated to a depth of about 13 feet below existing ground surface.

The recurrence interval for major seismic events (M7.0) for the Salt Lake City Segment of the WFZ is about 1,350 years (Black and others, 2003). Studies at South Fork Dry Creek and Dry Gulch (20± miles south of the site) indicate at least four major earthquake events in the last 6,000 years (Black and others, 1996). As such, there have been about four major seismic events since deposition of the fan alluvium. If the area investigated experienced surface fault rupture, it is reasonable to expect that evidence of faulting would be observable within the late Pleistocene to middle Holocene-age fan alluvium documented in the trench. Therefore, it is our opinion that the depth of the trench was sufficient for the purposes of the investigation.

The late Pleistocene to middle Holocene-age fan alluvium observed in the exploratory trench was demonstrably unbroken and stratigraphically continuous (Figure 4). The stratigraphic continuous nature of these sediments constitutes reasonable geologic evidence for the absence of active faulting. Therefore, it is judged that no Holocene-age faults are present within the area investigated.

11.0 CONCLUSIONS

Based on the scope of work performed for this study we conclude:

1. Relatively horizontal and stratigraphically continuous late Pleistocene to middle Holocene-age sediments were documented in the exploratory trench.

2. The unbroken and stratigraphically continuous late Pleistocene to middle Holocene-age sediments documented at the site constitute reasonable geologic evidence that Holocene-age (i.e., "active") faults are not present within the area investigated.

3. From the standpoint of surface fault rupture, the proposed building site is suitable for the proposed development, provided the recommendations presented herein are incorporated into design and development of the project.

4. The site is situated within a seismically active area; moderate to strong ground shaking should be anticipated within the life time of the development.

5. Owing to the nature of the deposits and site topography, potential damage due to secondary effects of seismic activity are judged to be low for earthquake induced rock falls and landsliding.

6. The Salt Lake County Planning Department, Surface Rupture and Liquefaction Potential Special Study Areas Map (Salt Lake County, 1995), indicates that the site is located in an area of very low liquefaction potential. Such areas have a less than 5 percent probability that the critical ground acceleration needed to induce liquefaction will be exceeded in 100 years. It was not within the scope of this study to evaluate the site-specific liquefaction susceptibility at the site.

12.0 RECOMMENDATIONS

Based on the findings of the study, we recommend the following:

1. A geotechnical study should be performed prior to design of structures. A copy of this report should be provided to the geotechnical engineer.

2. An SBI engineering geologist should observe all construction cuts and foundation excavations to substantiate the findings contained herein. If faults are identified in construction cuts or foundation excavations, further investigation, relocation of proposed structures, modification of the building foundations, and/or additional structural reinforcement may be required.

3. The materials used to backfill the exploratory trench were not compacted. In areas where foundations, slabs, or pavements extend into or cross the trench, the existing backfill should be completely removed and replaced by properly compacted engineered fill.

4. Additional structural reinforcement should be considered for proposed structures owing to the proximity of the site to active faults and associated potential for high levels of ground shaking.

5. Review and consideration of the Federal Emergency Management Agency (FEMA, 2005) document for avoiding earthquake damage; which suggests strapping water heaters to wall studs and installing flexible gas and water lines to reduce risk of fire and water damage in the event of an earthquake.

13.0 GEOLOGIC SERVICES DURING CONSTRUCTION

Recommendations presented herein are predicated upon the assumption that SBI will be permitted to observe all construction cuts and foundation excavations to substantiate the findings contained herein and that recommendations presented in this report were properly implemented.

14.0 CLOSURE

This report has been prepared by SBI, under the supervision of David B. Simon, an experienced engineering geologist and Professional Geologist licensed in the State of Utah. Mr. Simon's professional qualifications are presented in Appendix B. The findings and recommendations of this report were prepared in accordance with generally accepted professional engineering geologic principles and practices in this area of Utah, at this time. There is no other warranty, either express or implied.

This report is issued solely in response to the potential for surface fault rupture and therefore does not address other geologic or geotechnical issues (e.g., fissures, subsidence, differential settlement, seismic shaking and local liquefaction and ground failure, slope failures, expansive soils, etc.).

The conclusions and recommendations presented herein are based on the results of limited subsurface exploration, combined with interpolation and extrapolation of subsurface conditions between and beyond exploration locations, interpretation of aerial photographs, and review of available published geologic reports and maps.

As the project evolves, SBI's continued consultation and field verification should be considered an extension of the services performed to date. Recommendations presented herein are predicated upon the assumption that SBI will be permitted to observe all construction cuts and foundation excavations to substantiate the findings contained herein and that recommendations presented in this report were properly implemented. Where significant changes occur, it may be necessary that SBI augment, or modify, the recommendations presented herein.

Subsurface conditions may differ in some locations from those documented in the explorations, and may require additional analyses and possibly modified recommendations. If conditions observed during construction appear to be different from those indicated herein, this office should be notified immediately.

Development of property in the vicinity of active faults involves a specific level of risk. It is not possible to predict where ground rupture will occur during a seismic event. New faults may occur and existing faults may propagate beyond their present lengths. The primary purpose of the investigation is to prevent structures from being placed astride active faults. The investigation is predicted on the premise that future faulting will occur along pre-exiting faults.

This report was written for the exclusive use of the University of Utah Campus Design & Construction and only for the proposed project described herein. SBI is not responsible for technical interpretations by others of the information described or documented in this report. Specific questions or interpretations concerning the findings and conclusions presented herein may require written clarification to avoid any possible misunderstandings. The opportunity to be of service on this project is appreciated.

15.0 REFERENCES CITED

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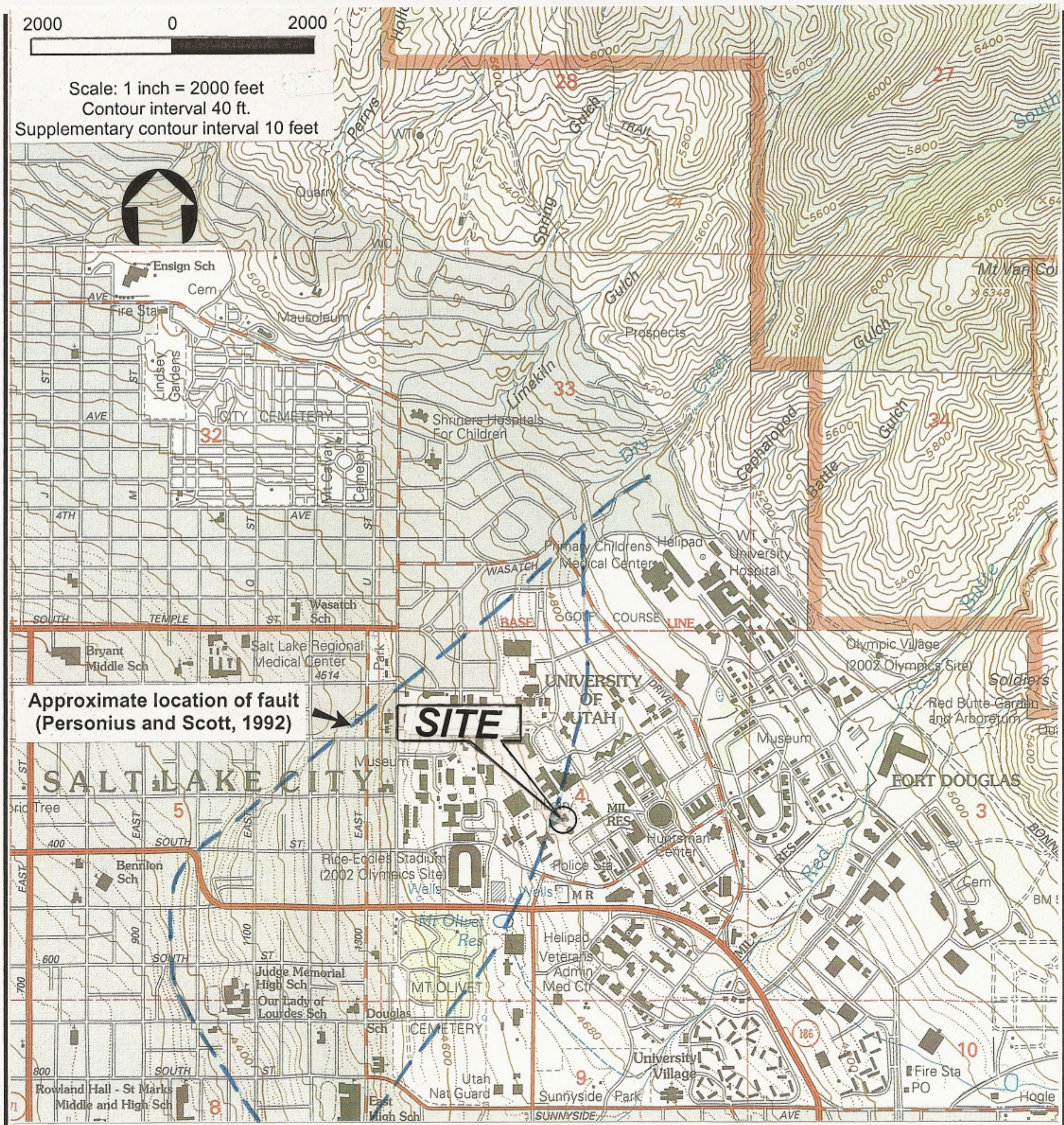
AERIAL PHOTOGRAPHS

SOURCE	DATE	FLIGHT	PHOTOGRAPHS	SCALE
U.S.D.A.	5-1958	AAL-21V	182, 183, and 184	1:10,000

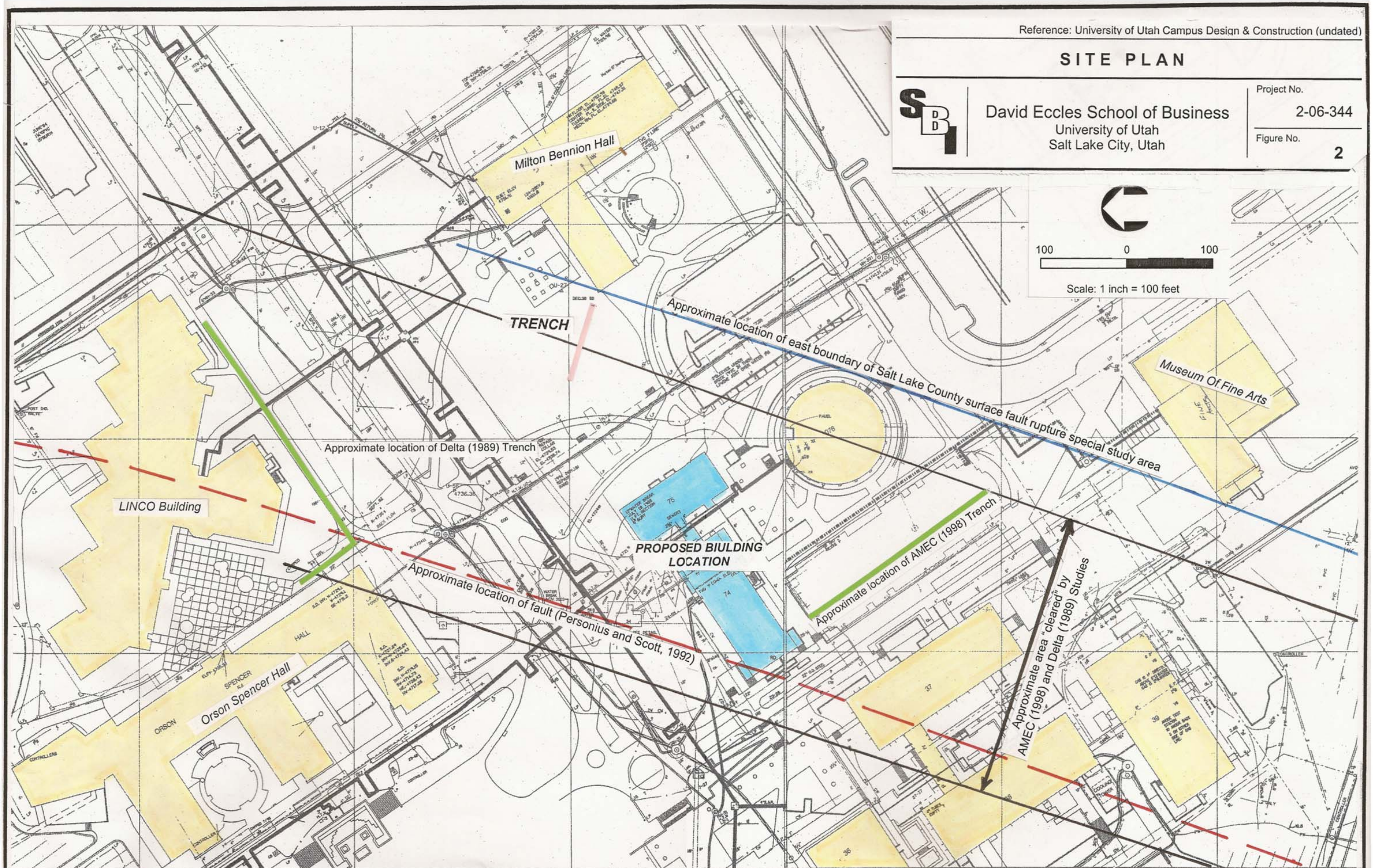
APPENDIX A
Figures

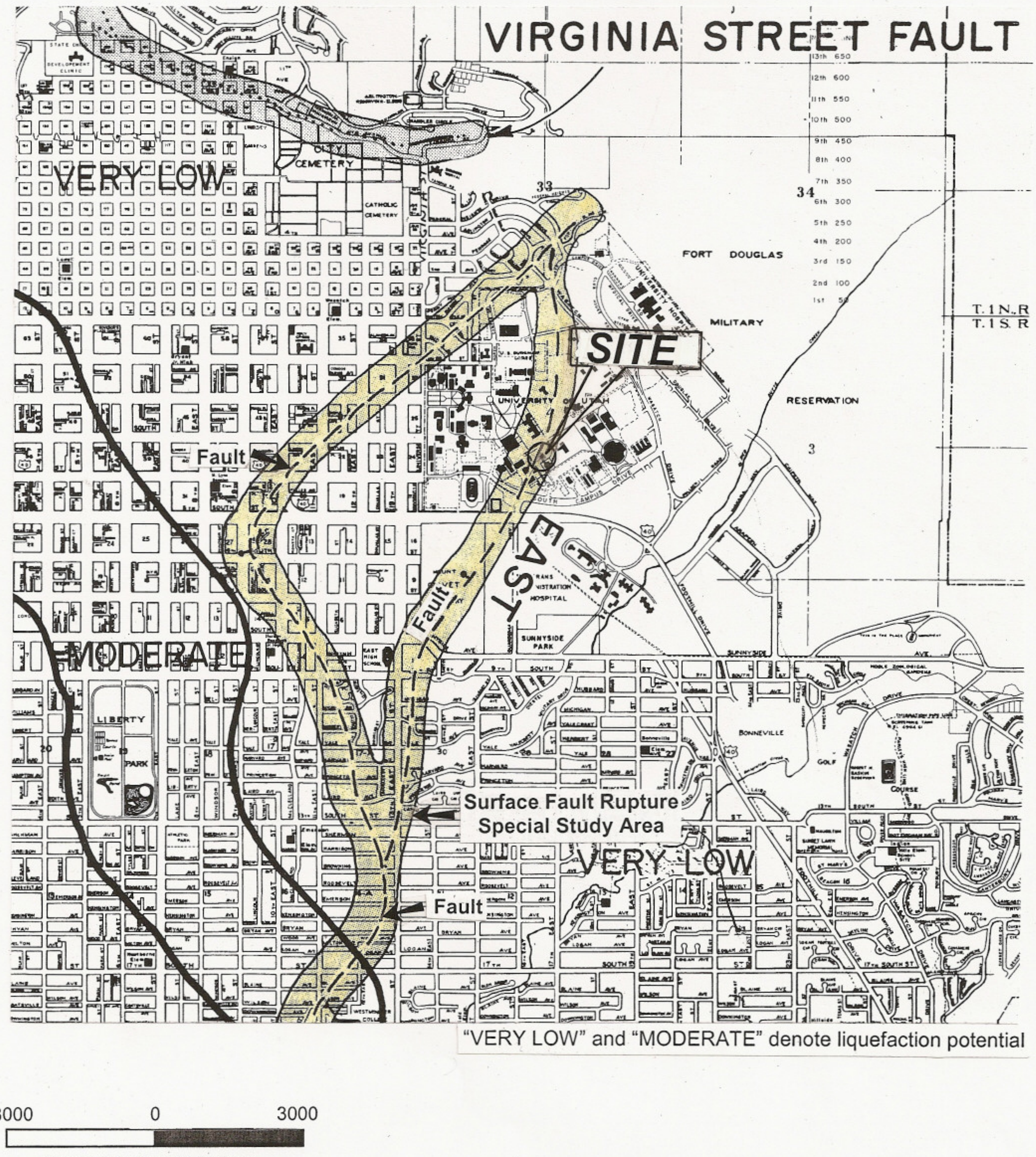


Reference: portion of the USGS Fort Douglas, Utah 7.5 minute Topographic Quadrangle (1998)

LOCATION MAP

SBI	David Eccles School of Business University of Utah Salt Lake City, Utah	Project No. 2-06-344 Figure No. 1


Reference: University of Utah Campus Design & Construction (undated)
SITE PLAN
David Eccles School of Business
University of Utah
Salt Lake City, Utah
Project No.
2-06-344
Figure No.
2
100
0
100
Scale: 1 inch = 100 feet
Milton Bennion Hall
TRENCH
Approximate location of east boundary of Salt Lake County surface fault rupture special study area
Museum Of Fine Arts
Approximate location of Delta (1989) Trench
LINCO Building
PROPOSED BIULDING LOCATION
Approximate location of AMEC (1998) Trench
Approximate location of fault (Personius and Scott, 1992)
Approximate area "cleared" by AMEC (1998) and Delta (1989) Studies
Orson Spencer Hall



Reference: Salt Lake County (1995)

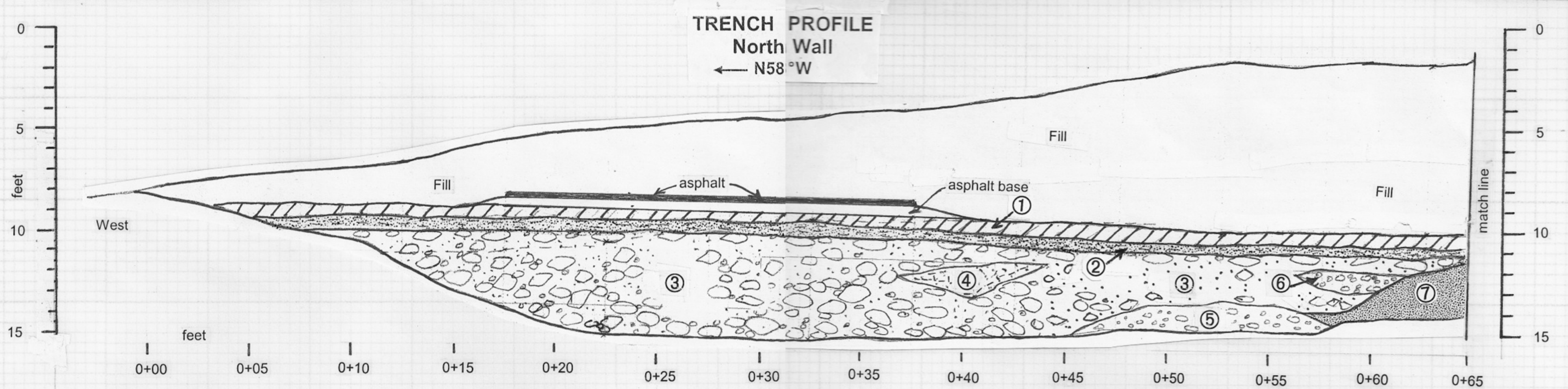
SURFACE FAULT RUPTURE SPECIAL STUDY AREA MAP

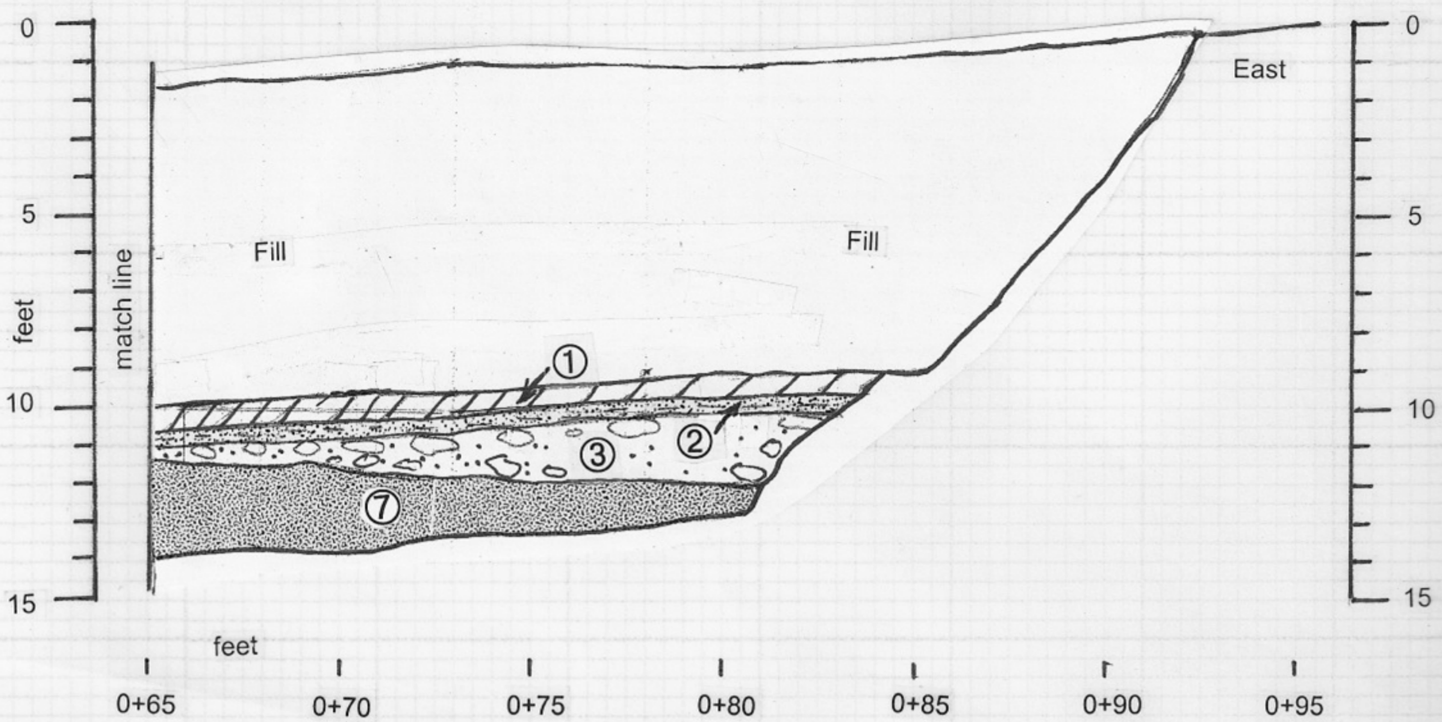
SBI

David Eccles School of Business
University of Utah
Salt Lake City, Utah

Project No. 2-06-344

Figure No. 3





Fill: Sand (SP), sandy silt (ML), and gravely sand (SP), mottled brown and light gray.

Unit 1 *Pedogenic Horizon* (Holocene)
A-horizon: Silty clay (CL) with some sand, organic, very dark grayish brown (10YR 3/2).

Unit 2 *Fan Alluvium* (late Pleistocene to middle Holocene)
Silty clay (CL) with some sand, dark brown (10YR 3/3).

Unit 3 *Fan Alluvium* (late Pleistocene to middle Holocene)
Sandy gravel (GP), 70± percent subangular to subrounded clasts (primarily quartzite and sandstone) ≤24-inches in length, average size ≤12-inches, matrix is a silty sand (SM) fine grained with some clay, brown (7.5YR 4/4).

Unit 4 *Fan Alluvium* (late Pleistocene to middle Holocene)
Clayey silt (CL) lens with carbonate filaments, reddish brown (5YR 4/3).

Unit 5 *Fan Alluvium* (late Pleistocene to middle Holocene)
Gravelly sand (SP), fine to medium grained with 30± percent subangular clasts ≤24-inches in length, yellowish red (5YR 4/6 to 5/6).

Unit 6 *Fan Alluvium* (late Pleistocene to middle Holocene)
Sandy gravel (GP) lens, 60± percent subangular clasts ≤6-inches in length, matrix is a sand (SP) fine to coarse grained, reddish brown (5YR 5/4).

Unit 7 *Fan Alluvium* (late Pleistocene to middle Holocene)
Silty sand (SM), fine grained, some clay, pale brown (10YR 6/3).

scale: 1 inch = 5 feet (horizontal and vertical)

Logged by: DBS
Date: 01-31-07

TRENCH PROFILE

David Eccles School of Business
University of Utah
Salt Lake City, Utah

Project No.
2-06-344

Figure No.
4

EXPLANATION

Lacustrine Deposits of the Bonneville Lake Cycle

lpg Lacustrine sand and gravel (uppermost Pleistocene; regressive phase)

lbg Lacustrine sand and gravel (upper Pleistocene; transgressive-phase)

lbm Lacustrine clay and silt (upper Pleistocene; transgressive-phase)

lbpm Lacustrine clay and silt, undivided (upper Pleistocene; undivided)

Alluvial Deposits

al1 Stream Alluvium (upper Holocene)

alp Stream Alluvium related to regressive phase of Bonneville Lake Cycle (uppermost Pleistocene)

(Fan Alluvium)

af2 Fan Alluvium 2 (middle Holocene to uppermost Pleistocene)

afb Fan Alluvium related to transgressive phase of Bonneville Lake Cycle (upper Pleistocene)

af4 Fan Alluvium 4 (upper middle Pleistocene)

Colluvial Deposits

chs Hillslope Colluvium (Holocene to upper Pleistocene)

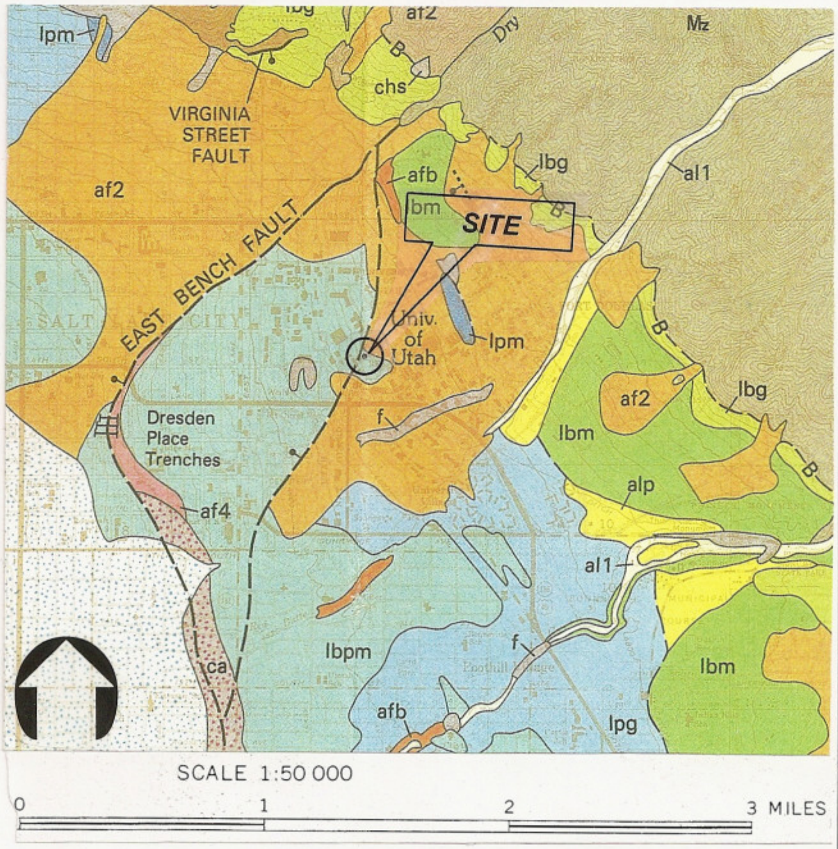
ca Colluvium and Alluvium, undivided (Holocene to middle Pleistocene)

Bedrock

Mz Mesozoic sedimentary rocks (Cretaceous to Triassic)

Fill Deposits

f Manmade Fill (Historic)



Contact - Dashed where approximately located; dash-dot lines are contacts between geomorphic features in a map unit.

Normal Fault - Bar and solid ball on down-dropped side along active Wasatch fault zone. Bar and hollow ball along other faults in bedrock. Dashed where approximately located, dotted where concealed and queried where origin is uncertain.

B —— Bonneville Shoreline

Reference: Personius and Scott (1992)

GEOLOGIC MAP

David Eccles School of Business
University of Utah
Salt Lake City, Utah

Project No. 2-06-344

Figure No. 5

APPENDIX B
Professional Qualifications

Simon • Bymaster Inc.

David B. Simon, P.G.
Principal Engineering Geologist
RESUME

QUALIFICATIONS SUMMARY

Mr. Simon has over 25 years of experience as an engineering and environmental geologist, is a Principal at Simon • Bymaster Inc. (SBI), and a former President of the Association of Engineering Geologists. Mr. Simon also serves as Consulting Geologist to the city of Draper, Utah, responsible for geologic consultation and implementation of the Draper City Geologic Hazards ordinance, which includes review of consultants' reports.

Representative experience includes geologic hazard and siting feasibility investigations, paleoseismic studies, active fault investigations, rockfall susceptibility evaluations, landslide and slope stability analyses, rippibility evaluations, construction management, and grading control/observation.

Mr. Simon's project experience includes public, commercial and industrial developments, large mass grading/earthwork projects, highways, water resources, dams, reservoirs, pipelines, airports, landfills, bridges, and other civil work.

PROFESSIONAL LICENSES AND CERTIFICATIONS

- Licensed Professional Geologist - California, Idaho, Utah, and Wyoming
- Certified Engineering Geologist - California
- 40-Hour Hazardous Waste Operations and Emergency Response

PROFESSIONAL ORGANIZATIONS

- Association of Engineering Geologists
- Geological Society of America
- Utah Geological Association
- Dixie Geological Society

PROFESSIONAL SERVICE ACTIVITIES

2007

- *Member* - Utah Geological Survey Board of Directors.
- *Chairman* – Morgan County Geologic Peer Review Committee
- *Committee Member* - Utah Geological Survey, Utah Seismic Safety Commission, and U.S. Geological Survey Liquefaction Working Group for the Wasatch Front, Utah.
- *Committee Member* - Utah Geological Survey, State Mapping Advisory Committee.
- *Continuing Education Liaison*, Utah - Association of Engineering Geologists (AEG).
- *Member* – AEG National Executive Council Nominations Committee.
- *Member* - AEG National Awards Committee.
- *Fieldtrip Chairperson* – 2007 GSA Rocky Mountain Section Meeting.

2006

- *Member* - Utah Geological Survey Board of Directors.
- *Committee Member* - Utah Geological Survey, Utah Seismic Safety Commission, and U.S. Geological Survey Liquefaction Working Group for the Wasatch Front, Utah.
- *Committee Member* - Utah Geological Survey, State Mapping Advisory Committee.

PROFESSIONAL SERVICE ACTIVITIES – continued

2006

- *Continuing Education Liaison*, Utah Section - AEG.
- *Member* - Executive Council Nominations Committee - AEG.
- *Member* - AEG National Awards Committee.
- *Invited Speaker* - University of Utah, Department of Civil and Environmental Engineering.
- *Keynote Speaker* - University of Utah annual meeting of Chi Epsilon, National Civil Engineering Scholastic Society.

2005

- *Member* - Utah Geological Survey Board of Directors
- *National Executive Council Member* - Association of Engineering Geologists.
- *Interim National Publications Director* - Association of Engineering Geologists.
- *Past President* - Association of Engineering Geologists.
- *Committee Member* - Utah Geological Survey, Utah Seismic Safety Commission, and U.S. Geological Survey Liquefaction Working Group for the Wasatch Front, Utah.
- *Committee Member* - Utah Geological Survey, State Mapping Advisory Committee.
- *Guest Speaker* - Southwest Section - Association of Engineering Geologist.
- *Continuing Education Liaison*, Intermountain Section - Association of Engineering Geologists.

2004

- *National President* - Association of Engineering Geologists.
- *Committee Member* - Utah Geological Survey, Utah Seismic Safety Commission, and U.S. Geological Survey Liquefaction Working Group for the Wasatch Front, Utah.
- *Panelist* - 2005 External Research Program for the U.S.G.S. National Earthquake Hazards Reduction program.
- *Ex Officio Director* - Board of Directors, AEG Foundation.
- *Committee Member* - Utah Geological Survey, State Mapping Advisory Committee.
- *Committee Member* - Utah Geological Survey, Utah Seismic Safety Commission, and U.S. Geological Survey Liquefaction Working Group for the Wasatch Front, Utah.
- *Guest Speaker* - Allegheny-Ohio Section - Association of Engineering Geologists.
- *Guest Speaker* - Carolinas Section - Association of Engineering Geologists.
- *Guest Speaker* - Great Basin Section - Association of Engineering Geologists.
- *Guest Speaker* - New England Section - Association of Engineering Geologists.
- *Guest Speaker* - Rocky Mountain Section - Association of Engineering Geologists.
- *Guest Speaker* - Sacramento - Association of Engineering Geologists.
- *Guest Speaker* - Southern California Section - Association of Engineering Geologists.
- *Guest Speaker* - St. Louis Section - Association of Engineering Geologists.
- *Guest Speaker* - Washington Section - Association of Engineering Geologists.
- *Guest Speaker* - Detroit Chapter - Association of Engineering Geologists.
- *Guest Speaker* - Baltimore-Washington-Harrisburg Section - Association of Engineering Geologists.
- *AEG National Representative* – American Geological Institute National Leadership Forum.
- *Continuing Education Liaison*, Utah Section - Association of Engineering Geologists.

2003

- *National Vice President and President Elect* - Association of Engineering Geologists.
- *Ex Officio Director* - Board of Directors, AEG Foundation.
- *AEG National Representative* - GSA Associated and Allied Societies Meeting.

PROFESSIONAL SERVICE ACTIVITIES - continued

2003

- *Committee Member* - Utah Geological Survey, State Mapping Advisory Committee.
- *Committee Member* - Utah Geological Survey, Utah Seismic Safety Commission, and U.S. Geological Survey Liquefaction Working Group for the Wasatch Front, Utah.

2002

- *Committee Member* - Utah Geological Survey, State Mapping Advisory Committee.
- *Invited Speaker*, Dixie Geological Society.
- *National Treasurer* - Association of Engineering Geologists.
- *Continuing Education Liaison*, Utah Section - Association of Engineering Geologists.
- *Distinguished Mentor*, Roy J. Shlemon Applied Mentor Program, 54th Annual Meeting of G.S.A. Rocky Mountain Section.

2001

- *Co-Chairman,* AEG/UGS/CECU - Geologic Hazards in Utah Conference
- *Invited Speaker*, University of Utah Geology Department - Ethics Course.
- *Committee Member* - Utah Geological Survey, State Mapping Advisory Committee.
- *Continuing Education Liaison*, Utah Section - Association of Engineering Geologists.

2000

- *Workshop Leader*, FEMA Project Impact 2000 Summit, Washington D.C.
- *Invited participant*, Earthquake Hazards Committee, Salt Lake City FEMA Project Impact.
- *Chairperson*, Natural Hazards Committee, Salt Lake City FEMA Project Impact.
- *Invited Speaker*, University of Utah Department of Geography, Geomorphology Course.
- *Committee Member* - Utah Geological Survey, State Mapping Advisory Committee.
- *Continuing Education Liaison*, Utah Section - Association of Engineering Geologists.
- *Invited Speaker*, BYU Department of Geology, Distinguished Lecturer Series.

1999

- *Board of Directors* - Utah Section - Association of Engineering Geologists.
- *Co-Chairman*, 42^{nd} National Meeting - Association of Engineering Geologists.
- *Field Trip Leader*, 42^{nd} National Meeting - Association of Engineering Geologists.
- *Continuing Education Liaison*, Utah Section - Association of Engineering Geologists.
- *Committee Member* - Utah Geological Survey, State Mapping Advisory Committee.
- *Invited Speaker*, University of Utah Department of Civil Engineering
- *Invited Speaker*, University of Utah Geography Department.

1998

Board of Directors - Utah Section of the Association of Engineering Geologists.

1997

Board of Directors - Utah Section of the Association of Engineering Geologists.

1996

Chairperson, Utah Section of the Association of Engineering Geologists.

1995

Chairperson, Utah Section of the Association of Engineering Geologists.

1994

Program Chair, Utah Section of the Association of Engineering Geologists.

1993

Program Chair, Utah Section of the Association of Engineering Geologists.

PUBLICATIONS

The Challenges of Geologic Review for Two Small Municipalities along the Wasatch Front, Utah (with D.W. Dobbins and A.E. Rowser), 2007, AEG News, Program with Abstracts - 2007 Annual Meeting, September 2007, Volume 50, p.85. Presented at the Perspectives on Regulatory Review Symposium at the 50th Annual Meeting of the Association of Engineering Geologists, Los Angeles, California, September 2007.

Engineering Geology - Highlights in Solid Earth (with Allen Hatheway), 2004, Geotimes, vol. 49. no. 7, p. 26, American Geological Institute, July 2004.

Engineering Geologists Play a Crucial Role in Providing Geologic Information to the Public (with A.W. Hatheway and R.J. Proctor), Article For Students, 2003, Geotimes, vol. 48. no. 12, p. 12, American Geological Institute, December 2003.

Holocene Faulting Near Piute Dam, Piute County, Utah (with R.J. Shlemon and E.W. Fall); AEG News, Program with Abstracts - 2002 Annual Meeting, July 2002, Volume 45, p.85. Presented to an Engineering Geology Technical Session at the 45th Annual Meeting of the Association of Engineering Geologists, Reno, Nevada, September 2002.

Landslide Complexes in Eastern Utah County, Utah - Implications for Hillside Development, 2002, (with E.W. Fall); Geological Society of America, Rocky Mountain Section, Abstracts with Programs, v. 33, no. 4, April 2002. Presented to the Hillslope and Mountain Slope Hazards in the Rocky Mountains Symposium, 54th Annual Meeting of G.S.A. Rocky Mountain Section, Cedar City, Utah, 2002.

Episodic Deposition in Closed Depressions: Proxy Evidence of Holocene Paleoseismic Events, Provo Segment of The Wasatch Fault Zone, Utah, 2001, (with R.J. Shlemon); Geological Society of America, Cordilleran Section, Abstracts with Programs, v. 33, no. 7, p. A-95. Presented to the Engineering Geology Technical Section, 97th Annual Meeting of G.S.A. Cordilleran Section, Universal City, California, 2001.

The Holocene "Downtown Fault" in Salt Lake City, Utah, 1999 (with R.J. Shlemon); 42nd Annual Meeting of the Association of Engineering Geologists, Program with Abstracts Volume, 1999, Salt Lake City, Utah, p.85. Presented at the Earthquake Hazards in Extension Regimes Symposium, 42nd Annual Meeting of the Association of Engineering Geologists, Salt Lake City, Utah, September 1999.

Holocene Ground Failure in Downtown Salt Lake City, Utah, 1999 (with R.J. Shlemon and S.F. Bartlett); Geological Society of America, Cordilleran Section, Abstracts with Program, v. 31, no. 6, p. A-95. Presented to the Engineering Geology Technical Section, 95th Annual Meeting of G.S.A. Cordilleran Section, Berkeley, California, 1999.

PUBLICATIONS - continued

Rejuvenation of Ancient Earth Fissures at Jackpot, Nevada, 1998 (with R.J. Shlemon), in Borchers, J.W., (ed.), Land Subsidence Case Studies and Current Research, Proceedings of the Dr. Joseph F. Poland Symposium on Land Subsidence (Association of Engineering Geologists Special Publication No. 8), Star Publishing Company, Belmont, California, p. 155-164.

Rejuvenation of Ancient Ground Fissures at Jackpot, Nevada: Engineering Geologic Implications, 1995 (with R.J. Shlemon); Association of Engineering Geologists, 1995 Annual Meeting, Abstract Volume, Sacramento, California, p.87.

Stabilization of Landsliding-Friendly Valley, Canyon Country, Los Angeles County, California, in Abstracts, 82nd Annual Meeting Cordilleran Section, Geological Society of America, 1986 (with C.M. Scullin), vol. 18, no. 2, p. 182. Presented at the Landslide Mitigation Symposium, 85th Annual Meeting of G.S.A. Cordilleran Section, 1986, Los Angeles, California.

Hot Dry Rock Geothermal Site Evaluation, Western Snake River Plain, Idaho, in Transactions, Geothermal Resources Council Annual Meeting, September 1980, Salt Lake City, Utah (with B.H. Arney, J.H. Beyer, F.B. Tonani and R.B. Weiss).

REPRESENTATIVE PROJECT EXPERIENCE - FAULT INVESTIGATIONS

Principal Engineering Geologist for numerous fault investigations for residential subdivisions and commercial and municipal projects located along the active Wasatch fault zone in Salt Lake, Utah, and Davis Counties, Utah and for projects located in Nevada and California. Representative Utah projects include:

- Principal Engineering Geologist: Despain Property and Granite Oaks Subdivision: Principal Geologist for fault investigation of 150 acres adjacent to the east and west sides of Wasatch Boulevard, immediately north of the La Calle restaurant.

- Principal Engineering Geologist: Piute Dam, Junction, Utah. Engineering geologic investigation as part of an engineering study to address requirements of State of Utah, Department of Natural Resources, Division of Water and Dam Safety Program. Investigation included detailed geologic mapping of a 1.5 square mile area, evaluation of regional seismicity, paleoseismic study of potentially active faults, seismic design criteria, and geologic hazard evaluation.

- Principal Engineering Geologist: Fault investigation for a proposed 5 million gallon reservoir site located in Pleasant Grove, Utah.

- Principal Engineering Geologist: Salt Palace Convention Center, Salt Lake City, Utah. Principal engineering geologist during evaluation of active faulting at the site of the Salt Palace Convention Center Expansion Project, Salt Lake City, Utah.

REPRESENTATIVE PROJECT EXPERIENCE – continued

- Principal Engineering Geologist: Fault Investigation, Fellerhoff Subdivision, 10739 South Wasatch, Boulevard, Salt Lake City, Utah.
- Principal Engineering Geologist: Fault Investigation, Alta Hills III - Subdivision, 8571 South Wasatch Boulevard, Salt Lake City, Utah.
- Principal Engineering Geologist: Fault Investigation, Nickell Residential Property, 1945 East 4500 South Street, Salt Lake City, Utah.
- Principal Engineering Geologist: Fault Investigation, Residential Property, 9612 South Glacier Lane, Salt Lake City, Utah.
- Principal Engineering Geologist: Fault Investigation, Stangl Residence, Lot 19, Lost Canyon Estates Subdivision, 11127 South Eagle View Drive, Sandy, Utah.
- Principal Engineering Geologist: Evaluation of Location of Granger Fault, Aspen Village Apartments, 3043 West 3500 South Street, Salt Lake City, Utah.
- Principal Engineering Geologist: Fault Investigation, Lot 16 of Cambria Pines No. 2 Subdivision, 5193 South Alvera Road, Salt Lake City, Utah.
- Principal Engineering Geologist: Fault Investigation, Cottage Pines P.U.D., 8098 South 3500 East Street, Salt Lake City, Utah.
- Principal Engineering Geologist: Fault Investigation, Arroyo Wells Subdivision, 5281 South Holladay Boulevard, Holladay, Utah.
- Principal Engineering Geologist: Fault Investigation, Les Liechty Plat "B", Approximately 2100 North 1459 East Street, Provo, Utah.
- Principal Engineering Geologist: Fault Investigation, Redwood Industrial Centre, 1911 West Indiana Avenue, Salt Lake City, Utah.
- Principal Engineering Geologist: Fault Investigation, Barnes Subdivision, Lots 108 and 109 Golden Hills No. 15 Subdivision, 9004 South and 9018 South Kings Hill Place, Salt Lake City, Utah .
- Principal Engineering Geologist: Fault Investigation, Todd Riches' Smog Shop Addition, 836 South Redwood Road, Salt Lake City, Utah.
- Principal Engineering Geologist: Fault Investigation, Lot 1 - Stahl Glacier Lane Minor Subdivision, 9600 South Glacier Lane, Salt Lake City, Utah.
- Principal Engineering Geologist: Fault Investigation, 1.5 Acre Industrial Property, 4108 West 600 South Street, Salt Lake City, Utah.